Evidence

- What is **not** enough…
  - "Here is a list of all our customers since 1979."
    One of the largest valve manufactures in the world
- The above evidence lacks everything:
  - No number of products
  - No number of operating hours
  - No feedback from customers
  - No evidence was submitted

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Do You Care About Safe Failures?

- Think about this when it comes to "proven in use"
  - Many manufacturers/suppliers want you to believe that their product is proven in use
    - Saves them a lot of analysis time
    - No development cost for measures to avoid and control failures
    - Time to market
  - If you do not get the appropriate answer from a supplier concerning dangerous failures then you will also not get answers concerning safe failures…spurious trips…$$$
  - In most cases only an user can claim "proven in use" on a product
    - Exceptions always exist

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Questions

- What is the difference between a device that is proven in use and a device that is not proven in use (certified or not)?
- What is better, a certified device or a proven in use device?
- If you had to install a safety device, what would you prefer to have?

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Sources of Reliability Data

- Many sources exist nowadays
  - End user data is usually the best
  - Prediction data is usually needed

Abbreviation	Description
OREDA	Offshore Reliability Data
MechRel	Handbook of Reliability Prediction for Mechanical Equipment
T-Book	Reliability Data of Components in Nordic Nuclear Power Plants
SINTEF	Reliability Data for Control and SafetySystems - PDS Data Handbook Sensors, detectors, valves & control logic
exida	Safety Equipment Reliability Handbook
CCPS	Guidelines for Process Equipment Reliability Data
PERD	Process Equipment Reliability Data (AIChE)

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Exercise # 14

- Case study: Make your case

As a sales person you are a team member that is bidding on a big project where the client wants to buy all the equipment to build several safety loops (sensors, logic solvers, valve positioners, valves). You are responsible for the sales of the pressure transmitter series of your company. After doing some research you found out that several competitors are also bidding on the same project. The pressure sensor product you are trying to sell is certified by a third party…

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Summary Module 7

- We learned
  - What is a certificate and who can certify
  - What is proven in use
  - How to prove proven in use
  - Sources of reliability data

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Using the Safety Instrumented System

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Using the Safety Instrumented System

- In this module
  - Installation and commission
  - Validation
  - Operation, maintenance and repair
  - Modifications and retrofit

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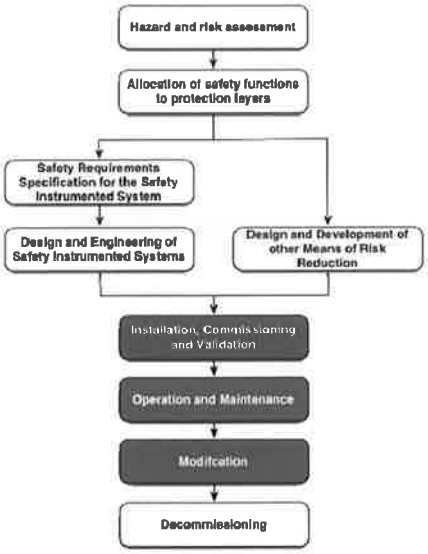
Where Are We?



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Installation and Commissioning

- Installation and commissioning must be
  - Carried out according to plan
  - What to document:
    - Installation and commissioning activities
    - Failure resolution, if any

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Installation and Commissioning

- Task for suppliers
  - Give the end-user sufficient documentation to install and commission the safety system correctly
- Tasks for end-users
  - Use the plan
  - Follow the manual

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Safety Validation

- Do we have the right system?
  - Validate that you got what you specified
  - Basis is the overall safety requirements specification
  - Use the validation plan
  - Perform FAT/SAT

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Safety Validation

- What needs to be documented
  - Validation activities
  - System and safety functions validated
  - Tools required during validation
  - Results of the validation
  - Any discrepancies
    - Why or why not to continue

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Operation, Maintenance and Repair

- In general
  - Implement the plan
  - Follow procedures for operation, maintenance and repair
    - Hardware
    - Software

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What to Pay Attention to?

- We need to have procedures for
  - Implementation
  - Maintenance schedules
  - Repair activities
  - Modifications
- Periodic safety audits (functional safety assessment)

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Documentation

- You need to document the following
  - Results of functional safety audits
  - Time and cause of demands, the performance of the safety system
  - Any failure causes and effects for equipment
  - Discrepancies found during maintenance
  - Any modification made (plant, control system, safety instrumented system)

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Modifications and Retrofit

- Objective is always no matter what we change we need to
  - Guarantee the safe state
  - Guarantee functional safety
- Follow modification procedure
  - As defined during management of functional safety

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Override Procedures

- Maintenance override is no problem as long as you guarantee the safety function
- Things to think about
  - Is there a procedure?
  - Are people informed?
  - Is the override time limited?
  - Do you lock out / tag out the area?
- See override procedure

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Summary module 8

- What did we learn…
  - Everything needs to be done according to the plan
  - Validation is the only chance to validate whether you got the right design
  - You cannot just modify things

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Conclusions

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Conclusions

- We have come to the end
  - Any final questions?
- Tomorrow
  - Please bring the eligibility forms
    - Make sure they are checked and signed
  - Please fill in our evaluation sheet
    - We want to improve our Functional Safety review program

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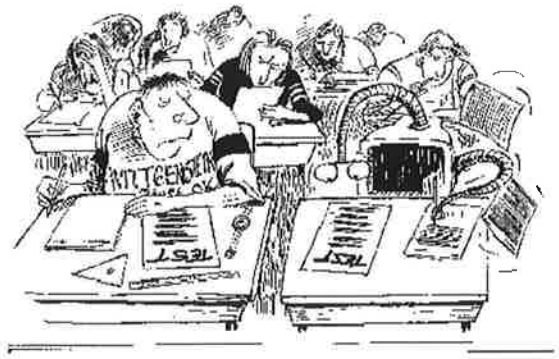
Good Luck Tomorrow

- We can automate a lot … but not everything



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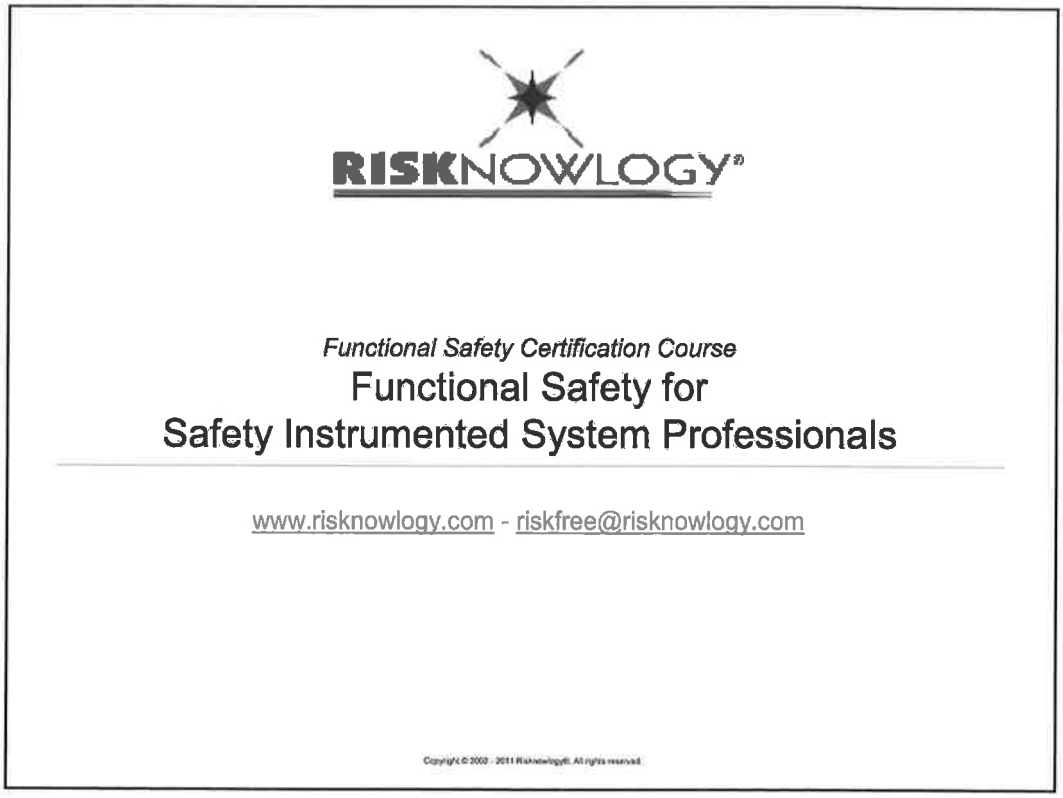
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